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DYNAMOD II IN A TIME SHARING ENVIRONMENT.

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THIS NOTE IS CONCERNED WITH THE DETAILED DESCRIPTION OF SEVERAL ASPECTS OF DYNAMOD II. ITS PURPOSE IS TO DESCRIBE THE ANALYTICAL ASPECTS OF THE MODEL AND TO SHOW HOW IT IS IMPLEMENTED AND USED IN A TIME-SHARING ENVIRONMENT. THE OVERALL STRUCTURE OF THE PROGRAM FOR THE MODEL IS DESCRIBED, AND THE VARIABLES DEFINED IN THE PROGRAM AND THE PART THEY PLAY IN THE PROGRAM ARE DISCUSSED. ANALYTICAL DEVELOPMENT OF THE PROGRAM, FILES AND THE MANNER IN WHICH THEY ARE SET UP, DATA STORAGE, OPTIONS AND FORMAT OF OUTPUT, THE USE OF THE SYSTEM IN A TIME-SHARING ENVIRONMENT, AND APPENDICES LISTING THE PROGRAM, DATA FILES, AND SAMPLE RUNS USING THE MODEL ARE INCLUDED. (HW)

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NATIONAL CENTER FOR EDUCATIONAL STATISTICS
Division of Operations Analysis

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by

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DYNAMOD II In A Time Sharing Environment

Introduction

This technical note is concerned with the detailed description of several aspects of DYNAMOD II. Its purpose is to describe the analytical aspects of the model and to show how it is implemented and used in a time-sharing environment. In order to achieve this purpose, the overall structure of the program for the model is first described, then the variables that will be defined in the program along with an explanation of their meaning and the part they play in the program is discussed. This is followed by an analytical development of the program, a discussion of files and the manner in which they are set up along with the storage of the data, a discussion of the output, its options and its format, a discussion of the use of the system in a time-sharing environment and appendices that display a listing of the program, listings of the data files, and listings of sample runs using the model.

For other descriptions of the model from the more practical side one should consider reading technical notes TN-28, TN-34, TN-39, and TN-40.

Mathematical Description

Given a matrix

$$A = \begin{bmatrix} a_{i_1 j_1} & a_{i_1 j_2} & \cdots & a_{i_1 j_n} \\ a_{i_2 j_1} & a_{i_2 j_2} & \cdots & a_{i_2 j_n} \\ \vdots & \vdots & & \vdots \\ a_{i_n j_1} & a_{i_n j_2} & & a_{i_n j_n} \end{bmatrix}$$

we shall refer to this as a sex/race group matrix where

$$a_{i_k j_m} = \begin{cases} p_{i_k j_m} & \text{if the element in this position is a non-zero transition probability} \\ 0 & \text{if the element in this position is not a meaningful cell of the matrix.} \end{cases}$$

For purposes of interpretation i_k and j_m will be constructed as follows:

$$i_k = X_1X_2 \text{ and}$$

$$j_m = X_1X_2$$

where X_1 is an integer chosen from the set $N = \{1,2,3,4,5,6,7,8,9\}$ and X_2 is also chosen from N. See appendix H for the categories that have been considered.

Next consider the vector

$$C = \{c_1, c_2, \ldots, c_n\}$$

where the c_i are also integer values from the set $Z = \{1,2,3, \ldots\}$ (and represent in the model, the number of individuals in category i where i is one of the preconstructed values $i_k = X_1X_2$). The model makes projections for any particular year and sex/race group by performing the matrix multiplication.

$$C^* = AC$$

where $c = \{c_1^*, c_2^*, \ldots, c_n^*\}$ and any c_j^* is the new number of individuals in the j-th category for the chosen year.

Implementing the Model

Converting the mathematical description of this model into an implementation of the model on the computer requires the employment of a manipulative algorithm that will treat the sparse matrix A in a much more efficient manner than storing every cell in the matrix. The rewards of doing this are several fold. First the actual computation time is reduced. The model is made much more general by allowing the user of the model to specify the "category codes" of his own choice. Lastly, the logical manner in which the files of data are constructed are made easier by reading in cell position indices at the same time that the transition probability values are read. Thus the order in which the data is entered into the file has a degree of flexibility.

It is necessary to define the values for i_k and j_m for any sex/race group along with the sex/race groups considered. Converting over at this point to the use of FORTRAN variable names used in the program will now allow us to bridge the gap between the verbal description of the implementation and the actual program that does the job. Appendix A attaches the meaning to every variable used in the program and accordingly should be consulted at appropriate times throughout the course of this note. Also the reader may wish to consult the flow chart of the program shown in appendix C, or the complete listing of the source program found in appendix D.

The sex/race groups under consideration in the model are as follows:

$$IJK = \begin{cases} 1 & \text{white males} \\ 2 & \text{white females} \\ 3 & \text{nonwhite males} \\ 4 & \text{nonwhite females} \end{cases}$$

The categories under consideration in the program are identified by the FORTRAN variable NTCAT where NTCAT possesses at one time during the course of execution of the program, one of the values from the set

{11, 17, 19, 21, 22, 27, 28, 29, 31, 32, 33, 37, 38, 39, 41, 42, 43, 44,
45, 47, 48, 49, 51, 52, 53, 54, 55, 56, 57, 58, 59, 64, 65, 66, 69, 70}

Remembering that each of the values in the above set represent i_k and j_m the position of each two digit integer X_1 X_2 has the following meaning.

X_1	Age grouping
1	0-4 years
2	5-14 years
3	15-19 years
4	20-24 years
5	25-44 years
6	44 + years
7	Dead

X_2	Occupation grouping
1	Elementary student
2	Secondary student
3	College student
4	Elementary teacher
5	Secondary teacher
6	College teacher
7	Elementary School Dropout
8	Secondary School Dropout
9	Other

For our purposes in this note it is enough to know that the transitional probability estimates are available to us so that we can assume we have the necessary estimates for the matrix A. What we want to consider in more detail is the form of the matrix. If one would look closely at the row and column categories of A he would find that the non-zero meaningful transition probabilities cluster around the principal and minor diagonals and the last column of the matrix A. To illustrate, the lines through the elements in the diagram below show approximately those matrix elements we are concerned with.

$$\begin{bmatrix} a_{i_1 j_1} & a_{i_1 j_2} & a_{i_1 j_3} & \cdots & a_{i_1 j_n} \\ a_{i_2 j_1} & a_{i_2 j_2} & a_{i_2 j_3} & \cdots & a_{i_2 j_n} \\ \vdots & \vdots & \vdots & & \vdots \\ a_{i_n j_1} & a_{i_n j_2} & a_{i_n j_3} & \cdots & a_{i_n j_n} \end{bmatrix}$$

Strictly as an illustration, let us consider the simplified example below which will illustrate with numbers the above matrix.

$i_k = X_1X_2$ \ $3_{3\leftarrow j_m} = X_1X_2$	11	12	13	21	22	23	31	32	33
11	.1 (10) [1]	.2 [2]	.5 [3]		.1 [4]				.1 [5]
12	.2 (20) [6]	.6 [7]	.1 [8]						.1 [9]
13		.3 (10) [10]	.5 [11]	.1 [12]					.1 [13]
21		.2 (10) [14]	.2 [15]	.4 [16]	.1 [17]				.1 [18]
22				.4 (30) [19]	.5 [20]				.1 [21]
23				.2 (20) [22]	.2 [23]	.4 [24]	.1 [25]		.1 [26]
31				.1 (10) [27]	.3 [28]	.5 [29]			.1 [30]
32					.2 (20) [31]	.3 [32]	.4 [33]		.1 [34]
33									.1 (5) [35]

In the algorithm that is used, we want to set up a category table in such a way as to be able to identify the first and the last non-zero transition probabilities in any row and to be able to identify from the index of the row position i_k and from the index of the column position j_m, the age group or the occupation group from X_1 X_2. In addition we want to read in only the non-zero transitional probabilities.

With the above objectives in mind then, let us use the index I to keep a running count of the non-zero transitional probabilities, PARMI (I), and their respective row and column indices, NTCAT and NCAT (I), respectively, along with the number of individuals, CELL (I), in each category, NTCAT, as they are read. Thus in the above diagram, I will be the number in the braces [ ], CELL (I) will be the value in the parentheses ( ), NTCAT will be the i_k values running along the rows of the matrix, NCAT (I) will be the j_m values running along the columns of the matrix and PARMI (I) are the values (that lie between zero and one) in main body of the matrix.

To construct the category table, (See appendix B), we start by reading the first non-zero probability in the matrix, PARM(I)= .1, but first setting I = 1, and at the same time identifying its position in the matrix, that is, NTCAT = 11, NCAT (I) = 11 and then accounting for the number of individuals in this category, CELL (I) = 10. As we proceed through the reading operation, we want to identify the first element in each row and also the last. Since this is the first element in row 1 of the matrix representing category NTCAT = 11 we set L (11) = 1. If we were to proceed on reading the rest of the elements in the above example we would generate the category table in appendix B.

Storing sex/race group data in files

Since the model is being implemented on a time-sharing system, data such as has been illustrated above needs to be stored in readily accessible form so that the data can be read at will upon selection of a sex/race group. From what has transpired above it is quite apparent that the data to be stored must consist of NTCAT, NCAT (I), PARMI (I), CELL (I) and a name CAT (I, KK) for the category row that the elements are in. Complete listings of the data files are shown in appendix E. A sample of data from one of the files is as follows:

CAT(I,KK) NTCAT CELL(I) NCAT(I) PARMI(I)

```
110 0-4 ELEM. STUDENT ,11,36,11,.1271,
120 0,0,17,.0935,0,0,21,.7475,0,0,27,.0233,0,0,78,.0086,
125 0,0,99,0,0
```

Note above that I and KK have a specific value at any particular point in the program.

The program for the model

The first step in developing a program for the model is to define the needed FORTRAN variables. For convenience, appendix A has been prepared which gives the name of each variable used in the program, along with its appropriate interpretation. Starting with the line numbers that appear to the left of each statement in the program, we see that line number 100 sets up for the program four files, one for each sex/race group, that is, the first file, WM, is to be interpreted as the file containing data for white males. The second

```
100 $FILE WM,WF,NWM,NWF
```

file, WF, contains data on white females, the third, NWM, on non-white males and the fourth, NWF, on non-white females.

```
110 DIMENSION S(10),CAT(200,3),VAL(200),CELL(200),PARMI(200)
120 DIMENSION NCAT(200),NT(100),L(99),LL(99),BARGS(10)
130 DIMENSION BARG6(10),TARGS(11,9),TARG6(11,9)
```

To reserve room for each variable in the program the dimension statements of line numbers 110, 120 and 130 set up appropriate space for each of the FORTRAN subscripted variables.

At the beginning of the program in line numbers 135 through 145, it is necessary that the variables, TARG5(I,J) and TARG6(I,J), that retain the totals for each age and occupation group for each year, be initialized (or set) to zero.

```
135 DO 340 I=1,11
136 DO340 J=1,9
140 TARG5(I,J)=0.0;TARG6(I,J)=0.0
145 340 CONTINUE
```

Next, it is necessary that all computations and logical loops be performed for each and every sex/race group. In line 150 the DO statement will perform this function.

```
150 DO390IJK=1,4;IJ4=1
```

Notice also that IJ_4, the variable that will keep track of the year we are on at any point in the program, is set initially at 1.

In the next group of line numbers, 155 through 180, a print statement will label the output and inform the user of the sex/race group output data that is to follow. Since the years that are under consideration in the model are 1960 through 1970, line number 160 takes care of this specification.

```
155 PRINT,"INPUT DATA FOR SEX/RACE GROUP",IJK,"FOLLOWS"
160 IYR1=1960;IYR3=1970;
170 READ(IJK)IS,(S(J),J=1,10)
175 PRINT,"BIRTH VECTOR ELEMENTS"
180 PRINT,(S(J),J=1,10);LSIZE=99
```

At the beginning of each file, for any sex/race group, one finds as the first item of data the value of the category into which the number of births that occur each year will be added. This is followed by the ten data items that represent the number of births to be expected in each of the ten years of the projection. Thus in line number 170, these data items are read from sex/race group file IJK. A label that tells the user that the birth vector elements will be printed and the execution of this printing function is fulfilled with line numbers 175 and 180. Notice also in line number 180 that the upper limit for which legitimate codes may be constructed is defined by the statement LSIZE = 99.

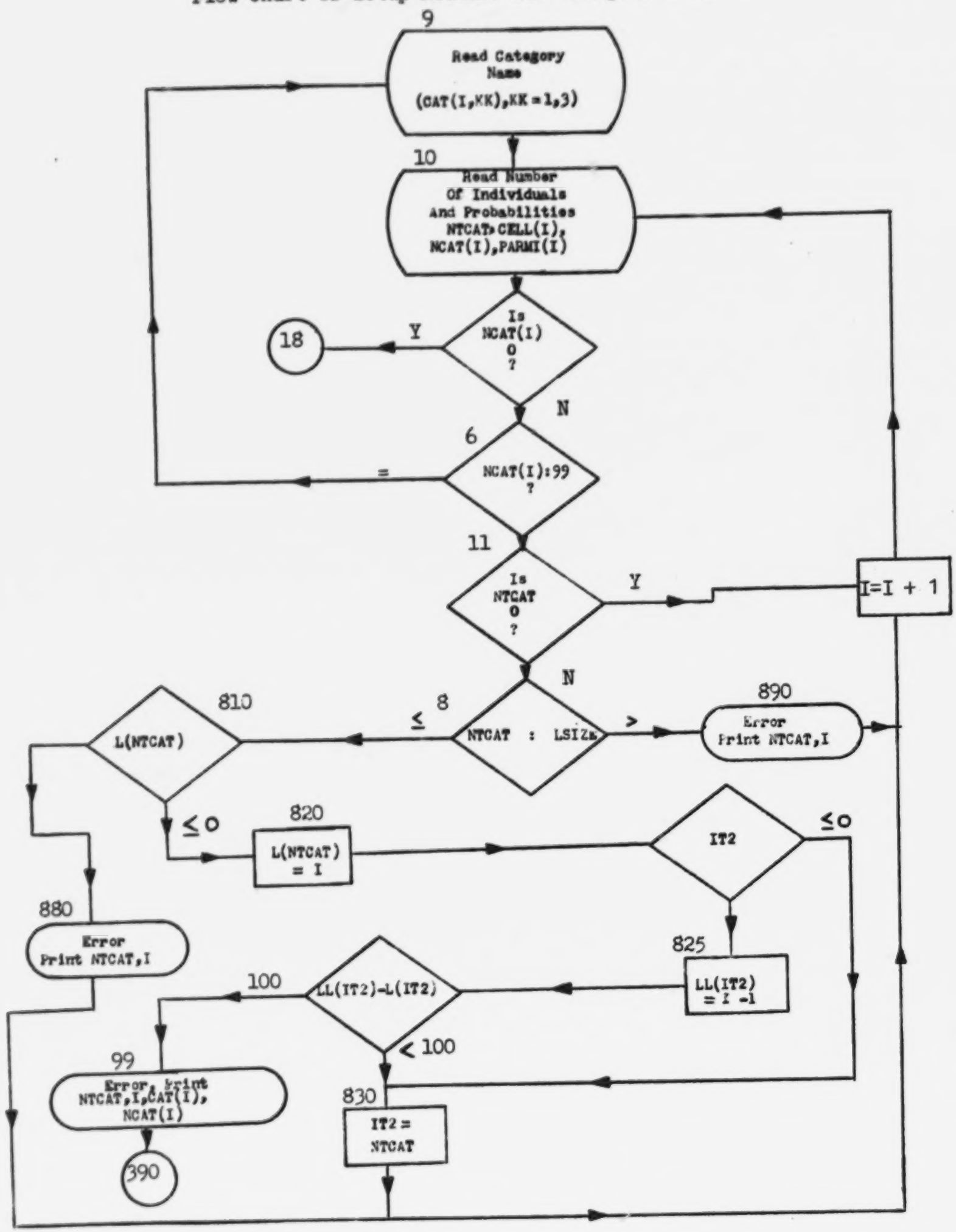
The block of program statements starting with line number 190 and ending with 210 performs the following functions: the variables, L (J)

```
190 DO1050J=1,LSIZE;L(J)=0;LL(J)=0;1050 CONTINUE;"
200 IT2=0;I=1;9 READ(IJK,2)(CAT(I,KK),KK=1,3)
202 2 FORMAT(4X,3A6)
210 10 READ(IJK)NTCAT,CELL(I),NCAT(I),PARM1(I)
```

and LL (J), that are used to define the first and the last element positions in any row of the transition probability matrix A, for each value of J, are initialized to zero in line number 190. Since IT2 is the variable name used as an index in setting up the category table (line numbers 218 to 300) it is necessary to set it initially to zero. Similarly, the variable I starts with 1 and during the course of setting up the category table is incremented by 1 in line number 260 after all set up operations have been performed. The first category name is then read. All of these functions are executed in line number 200. Line number 202 merely satisfies the "formated" read statement in line number 200. It is well worthy of note to understand why FORMAT statement 2 in line number 202 has a 4X preceding the 3A6 specification. When one uses files in his program he must make provision in a "formated" read statement for not only the data that is to be read but also for the positions that the line number occupies along with the space following the line number. Next in line number 210 for each probability, PARM1 (I), read, the indices NTCAT and NCAT (I) are specified thus locating the position in matrix A that PARMI (I) occupies. Notice that the number of individuals in category NTCAT, CELL (I), is also read each time, but only the first time the read statement is executed is the value of CELL (I) non-zero.

The next block, line numbers 218 through 300, can be expressed as a "table set up algorithm" and it is helpful to visualize its structure by considering the following flow chart.

Flow Chart of Setup Routine for Category Table



The logic in the flow chart along with the statements to implement this algorithm can be described in the following manner. After a transition

```
218 IF(NCAT(I))6,18,6
220 6 IF(NCAT(I)-99)11,9,11
222 11 IF(NTCAT)15,15,8
223 8 IF(NTCAT-LSIZE)810,810,890
230 810 IF(L(NTCAT))820,820,880
231 820 L(NTCAT)=I
232 IF(IT2)830,830,825
233 825 LL(IT2)=I-1
250 IF(LL(IT2)-L(IT2)-100)830,99,99;830 IT2=NTCAT
260 15 I=I+1;GO TO 10
264 18 LAST=I-1;IF(IT2)99,99,19
270 19 LL(IT2)=I-1;20 IF((IS-1)*(LSIZE-IS))99,23,23;
280 23 IST=IS;IF(L(IST))99,99,25;25 CONTINUE;
290 DO27I=1,LAST
295 260 IF((NCAT(I)-1)*(LSIZE-NCAT(I)))99,262,262
300 262 NCATT=NCAT(I);IF(L(NCATT))99,99,27;27 CONTINUE;
```

probability has been read, in line number 210, the value of NCAT (I) is checked to see if, in the data read, the program has located a zero. The reason for this is quite simple. We will organize our data and define a rule such that the zero the program finds for the value of NCAT (I), will indicate that all data for the IJK-th sex/race group has been read. Therefore the way we will organize our data is: for each non-zero transition probability NCAT (I) will have its appropriate non-zero value. However, when we get to the very last value in the file, we will purposely put in a zero value for the next NCAT (I) so that when it is read, a transfer will be made out of the category set up routine to the next part of the program. The detection of this zero occurs in line number 218. If, however, NCAT(I) is non-zero, then we move on to see if the value of NCAT(I) is equal to 99. Why? This is another means of controlling the data inputed in the program. If the program detects a 99 it will have the following meaning: A 99 is inserted after the last non-zero transition probability has been read in any row. Thus if and when it is found, the program will transfer to statement number 9 and read the category name for the next category.

When the data file is set up the value of NTCAT is always zero except for the first non-zero probability read from each row. This being the case in line number 222, we see that whenever we read any element other than the one in the first position in any row we just increment I in line number 260 and go back to read statement 10 and read the next set of data. If this is the first element we must at line number 223 perform an error check. This is to determine if the limits of the size of the table have been exceeded. If we do find that NTCAT LSIZE, we make a transfer to FORTRAN statement number 890. Being that we have no error condition, NTCAT LSIZE, we proceed to line number 230. It is next necessary to perform another error check, that is, since we have in line number 190 initialized all L(J) to zero and we wish each L(J) to, at most, be assigned one and only one non-zero value, it is possible to find a previous L(J), for any J, to be non-zero when we have an erroneous condition in the data that is read. If no error is found we pass on to line number 231 where the present value of I is assigned to category NTCAT and thus identifies the first element in category NTCAT to be the I-th entry in the category table.

Next remembering that IT2 has been set initially to zero in line number 200, at line number 232 we must define the value of IT2 to take a new category value if this is not the first time through. This is because the first element in the first row of matrix A does not have a preceeding row with a last element, therefore line number 233 must be skipped with IT2 taking the value of the present category in FORTRAN statement number 830. Whenever IT2 is not zero, after line number 233, in line number 250, another error check is made to make sure that the number of elements in any row of A does not equal or exceed the maximum allowable order of the matrix. To do this, these conditions

$$LL(IT2) - L(IT2) \begin{cases} \geq 100 \\ < 100 \end{cases}$$

are checked. Of course an error has occurred if the first condition has been satisfied.

Notice that when an error does occur in any of the three previous error checks, a message is printed out to the user telling him about it and also indicating the category NTCAT and the number of the element where the error occurred. This is very useful to the user as a means of locating faulty data in his files.

After every category NTCAT and its predecessor NTCAT-1 have been identified with a first element L(NTCAT) and a last element LL(NTCAT-1), we are ready, in line number 260, to increment I by 1 and go back and read the next data element in the NTCAT-th category.

In order to get to line number 264 and out of the category set up routine notice that, as mentioned previously in line number 218, a branch is made to FORTRAN statement number 18. When this branch is taken further error checks are made in line numbers 264, 270, 280, 295 and 300. The first error check in line number 264

```
IF (IT2) 99, 99, 19
```

is to see if the category set up routine has been entered at least once. This is, if it hasn't then IT2 will have a value of zero. The second error check in line number 270

```
IF((IS-1) * (LSIZE-IS))99, 23,23
```

makes sure that IS is a legitimate code for the birth vector elements to be added to. The third error check in line number 280

```
IF (L (IST) ) 99, 99, 25
```

makes sure that a transition probability for (code IST = IS) a specified category exists. The fourth error check in line number 295

```
IF ((NCAT (I) - 1) * (LSIZE-NCAT (I))) 99, 262. 262
```

makes sure that for each I there exists a transition probability in column NCAT (I) which has a legitimate range for its code. The last error check in line number 300

```
IF (L (NCATT)) 99, 99, 27
```

looks to see that each code NCAT(I) where NCATT = NCAT(I) is legitimate.

Summarizing to this point, we see that after the data has been read from the sex/race group file it is thoroughly edited for code legitimacy, range of code definition and validity of the data stored. Next in line number 310

```
310 28 IYR2=IYR1;30 IT=IYR2-IYR1+1;
```

the current year variable, IYR2, is initially set to the first year, IYR1. Then since we wish to have the following correspondence between IT and IYR2,

IYR2	1960	1961	1962	...	1970
IT	1	2	3	...	11

FORTRAN statement number 30 is executed.

Because CELL (I) is the subscripted variable name used when reading in the number of individuals in a category, it is necessary to define another variable VAL (I) which will be used when computations are made later on that involve the number of individuals in a category. The block of statements from line number 320 to 330 performs this function.

```
320 DO40J=1,LSIZE;I=L(J);IF(I)40,40,38;
330 38 VAL(I)=CELL(I);CELL(I)=0.;40 CONTINUE;
340 PRINT,"NUMBER OF PERSONS IN YEAR",IYR2;
```

In line number 340 the label along with year is announced.

In the block 350 to 356 the variables BARG5 (IJI) and BARG6 (IJ) are initialized to zero.

```
350 DO310IJ1=1,10
354 BARG5(IJ1)=0.0;BARG6(IJ1)=0.0
356 310 CONTINUE
```

In the block 360 to 490 we start out in line 360 initializing TVAL to zero. Then for each possible code

```
360 TVAL=0.0
370 110 DO150J=1,LSIZE;IF(L(J))150,150,112;
380 112 I=L(J);120 PRINT121,J,(CAT(I,KK),KK=1,3),VAL(I)
390 121 FORMAT(I6,4X,3A6,F12.0)
400 TVAL=TVAL+VAL(I)
410 DO304IJ1=2,10
420 IF(J-IJ1*10)301,304,304
430 301 BARG5(IJ1-1)=BARG5(IJ1-1)+VAL(I);GO TO 302
440 304 CONTINUE
450 302 DO303IJ2=1,9;DO303IJ3=10,90,10;
460 IF(J-IJ2-IJ3)303,305,303
470 305 BARG6(IJ2)=BARG6(IJ2)+VAL(I);GO TO 306
480 303 CONTINUE;306 CONTINUE;
490 150 CONTINUE
```

J = 1, ..., LSIZE, the entry is checked to find the value of each category index, I = L(J), and to print the category name along with the number of individuals in that category. Line numbers 370, 380 and 390 take care of this matter. As a result, the following output is an example of what the user could expect. Another example of this detailed output is shown in appendix F.

11	0-4 ELEM. STUDENT	142.
19	0-4 OTHER	7987.
21	5-14 ELEM STUDENT	15474.
22	5-14 SEC. STUDENT	1028.
27	5-14 ELEM DROP-OUT	14.
28	5-14 SEC. DROP-OUT	10.
29	5-14 OTHER	1687.
31	15-19 ELEM STUDENT	391.
32	15-19 SEC. STUDENT	5174.
33	15-19 COL. STUDENT	1284.
37	15-19 ELEM DROPOUT	86.
38	15-19 SEC DROP-OUT	455.
39	15-19 OTHER	993.
41	20-24 ELEM STUDENT	40.
42	20-24 SEC. STUDENT	198.
43	20-24 COL. STUDENT	1516.
44	20-24 ELEM TEACHER	29.
45	20-24 SEC. TEACHER	90.
47	20-24 ELEM DROPOUT	1.
48	20-24 SEC. DROPOUT	125.
49	20-24 OTHER	5067.
51	25-44 ELEM STUDENT	36.
52	25-44 SEC. STUDENT	159.
53	25-44 COL. STUDENT	895.
54	25-44 ELEM TEACHER	120.
55	25-44 SEC. TEACHER	255.
56	25-44 COL. TEACHER	196.
57	25-44 ELEM DROPOUT	02.
58	25-44 SEC. DROPOUT	8.
59	25-44 OTHER	18615.
64	44+UP ELEM TEACHER	55.
65	44+UP SEC. TEACHER	107.
66	44+UP COL. TEACHER	144.
69	44+UP OTHER	24695.
70	DEAD	7935.

In line number 400, for each value I the number of individuals in the J-th category is added to a variable TVAL which at the end of the block at line number 490 will be equal to the total number of individuals across all categories. Next in the inner block 410 to 440 the totals for each age group, i_k, is computed.

The details of how this works is as follows. Looking at the two digit code X_1 X_2 (= i_k), one way of getting at X_1, or the value of a particular age group, is to run IJ1 from 2 through 10 and then to check the difference,

(category J) - IJ1 * 10

or X_1 X_2 - IJ * 10

notice that when the result of taking J - IJ1 *10 is negative that we have found the age group to which category J(=11) belongs. Why? Because if we enumerate the possibilities that occur when IJ1 varies (2 to 10), for a particular value of J, we have

IJ1	2	3	4	5	6	7	8	9	10
IJ1*10	20	30	40	50	60	70	80	90	100

so that if we check the relation of J to IJ1*10, we can determine the interval that J belongs in. The reason is that the value of J-IJ1*10 will be negative when we have found the interval. An example may help. Say that J = 11. We can see by inspection that J = X_1 X_2 = 11 shows that X_1 = 1 and therefore J = 11 is a category that is made up of age group 1. Comparing J with IJ1*10, we immediately see that 11 - 20 = -9 and thus IJ1-1 = 2-1 = 1 is the appropriate age group.

In a somewhat similar fashion, in block 450 to 480 the sums for each occupation group are computed. That is, running IJ2 from 1 to 9 and IJ3 from 10 to 90 by increments of 10 all have

IJ2	1	1	...	1	2	2	...	2	9	9	...	9
IJ3	10	20	...	90	10	20	...	90	...10	20	...	90
-IJ2-IJ3	-11	-21	...	-91	-12	-22	...	-92	-19	-29	...	-99

It is quite easy to see that the condition we wish to detect, since we are looking for a particular value of X_2, is when J is equal to IJ2 + IJ3, because then we know that the J-th category is made up of the IJ2-th occupation group.

To explain this block, J is cycled through the entire loop from 1, by increments of 1, to LSIZE. For each value of J we locate the first element L(J) in each category. That is,

IF(L(J)) 300, 300, 215

Next, to find the limits for each category row we set

IT1 = L(J) and IT2 = LL(J).

Then, in line numbers 620 through 640, we make sure that the probabilities in any row of the matrix A are going to sum to 1. In line numbers 650 to 680, the projected number of individuals to add to the J2-th category

WT(K) * VAL (IT1)/TWT

is added to the present number of individuals, CELL(J2), in that category.

Our last computation in the program is to locate the appropriate category

J = L(IS)

and then add the number of births for the IT-th year, S(IT), to the numbers of individuals, CELL(J), already in the category from the previous year.

690 J=L(IS);CELL(J)=S(IT)+CELL(J);

This computation is performed in line number 690.

The next block, 695 to 730, takes care of the 3 possible error print outs that are used when an error routine picks up an error.

```
695 PRINT,"J = ",J," CELL(J) = ",CELL(J)
700 400 GO TO 30
705 880 PRINT,"NTCAT = ",NTCAT,"I = ",I,"  880"
710 GO TO 15
715 890 PRINT,"NTCAT = ",NTCAT, "I = ",I,"  890"
716 GO TO 15
720 99 PRINT,"NTCAT = ",NTCAT,"I = ",I,"CATEGORY IS "
725 PRINT,(CAT(I,KK),KK=1,3),"NCAT(",I,") = ",NCAT(I)
730 500 CONTINUE;390 CONTINUE
```

After we have run through all sex/race groups, that is, IJK = 1 to 4, the final totals, across sex/race groups, for each occupation and each age group for each year, we will, in block 740 to 785, print out a summary of these results. The resulting output is shown in appendix G.

```
740 PRINT,"TOTALS FOR CODES";
750 IJ5=IYR1-1;DO346IJ4=1,11;
760 IJ5=IJ5+1;
770 PRINT,(TARG5(IJ4,IJ1),IJ1=1,9),IJ5;
780 PRINT,(TARG6(IJ4,IJ2),IJ2=1,9);
785 346 CONTINUE
789 $OPT SIZE
790 END DYNAMOD
```

APPENDIX A

Definition of FORTRAN Variable Names in DYNAMOD II

BARG 5 (IJ1) - This variable is used to keep a running tally of the number of individuals projected into the IJ1-th age group for a particular year.

BARG 6 (IJ2) - This variable is used to keep a running tally of the number of individuals projected into the IJ2-th student-teacher group for a particular year.

CAT(I,KK) - This variable holds the name of the category for the first Ith value of any category. The name is stored in three 6 character chunks, thus the total length of any name can be as large as 18 characters.

CELL (I) - This variable retains the number of individuals for the first Ith value of each category when these values are read in from a sex/race group file.

I - This variable runs from 1, 2, ... up to a maximum of 220 where the index corresponds to the Ith non-zero transition probability read.

IJ4 - This variable serves as an index to keep track of the year.

IS - This variable gives the starting point at which the number of births are added for any year.

IT - This variable is the sequence index corresponding to the IYR2-th year we are on.

IT2 - This variable is used to temporarily store the value of the previous category.

IYR2 - This variable is the current year index which will contain the value of the year that we are on at any point in the program.

IJK - This variable keeps the value of each particular sex/race group. that is, IJK = 1 WM; 2 WF; 3 NWM; 4 NWF

L(NTCAT) - This variable retains the value of the index I for the first non-zero transition probability read in the NTCAT-th category row.

LL(NTCAT) - This variable keeps the value, of the index I, for the last non-zero transition probability read in the NTCAT-th category row.

LSIZE - This variable sets the up limit on the codes which may be used.

PARMI(I) - This variable is used to store the value of the I-th non-zero transition probability for a sex/race group.

NCAT(I) - This variable keeps the value of the column index for the I-th non-zero transition probability read.

NTCAT - This variable at the point where a non-zero transition probability has just been read has the value of the row category index.

S(J) - This variable is defined to keep track of the number of births in each of the 10 chosen years: J = 1, 2, ..., 10.

TARG5(IJ4,IJ1) - This variable keeps a running tally of the number of individuals projected into the IJ1-th age group for the IJ4-th year.

TARG6(IJ4,IJ2) - This variable keeps a running tally of the number of individuals projected into the IJ2-th occupation group for the IJ4-th year.

TVAL - This variable retains the total number of individuals across age and occupation groups for any year.

VAL(I) - This variable retains the number of individuals for the first I-th value of each category.

WT(K) - This variable keeps the value of the transition probability for the Kth position in any particular row.

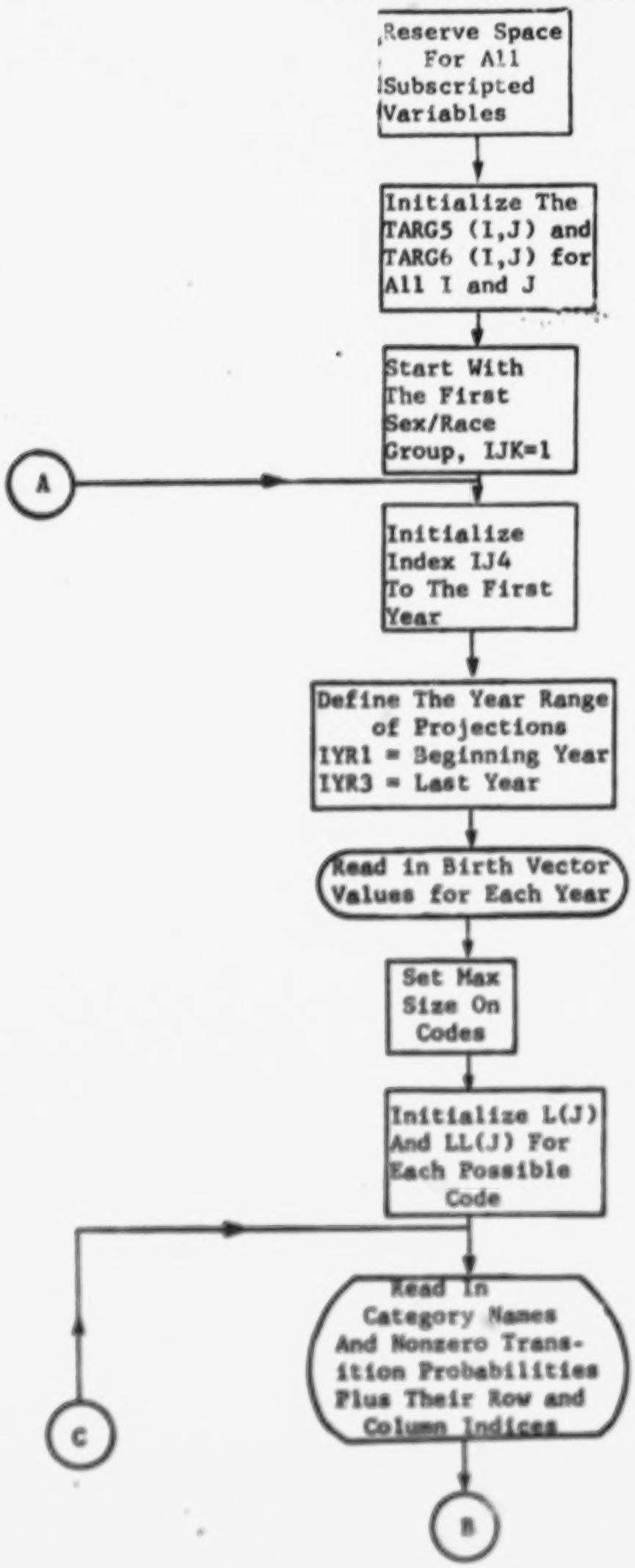
Appendix B

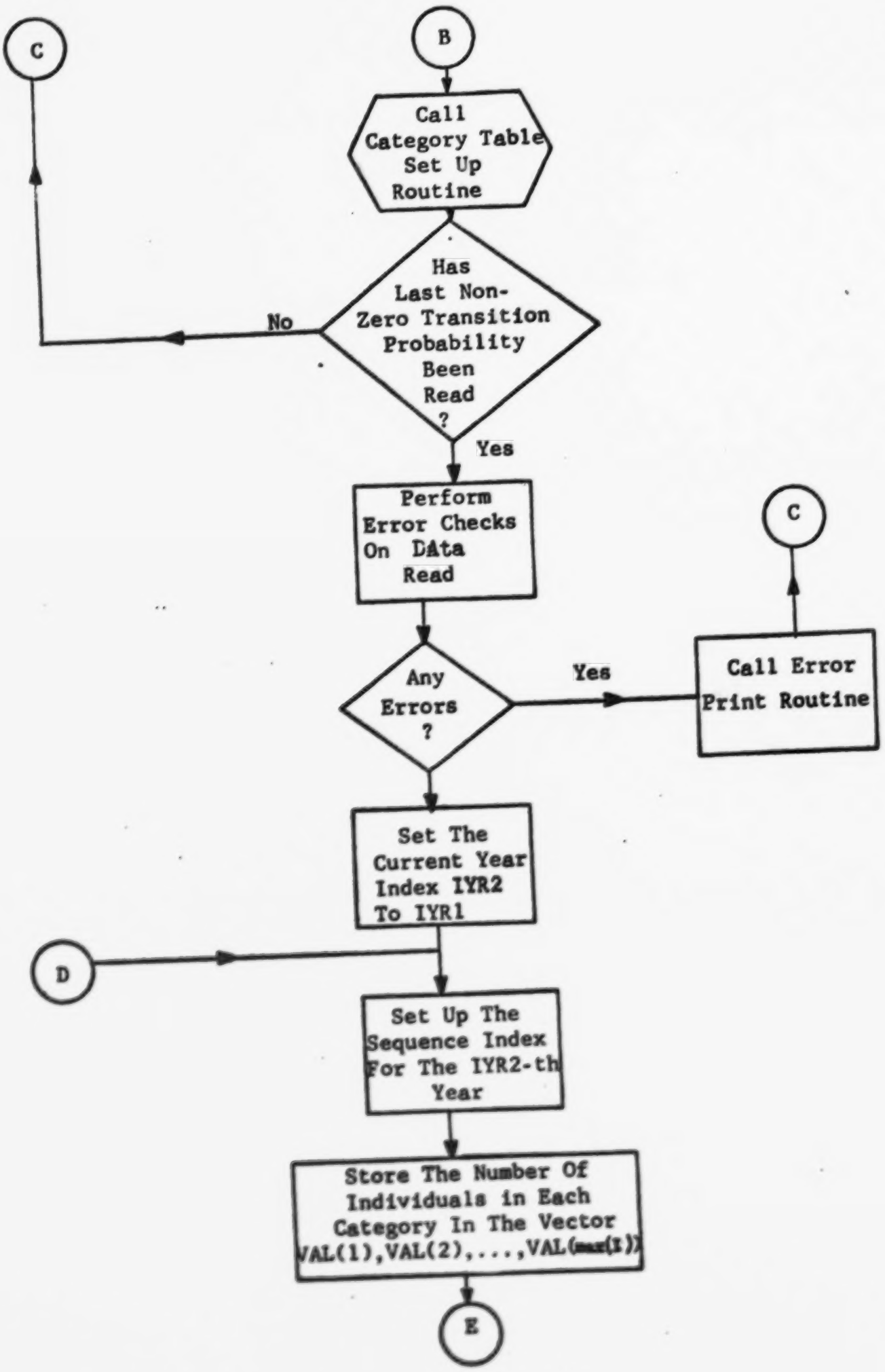
Category Table

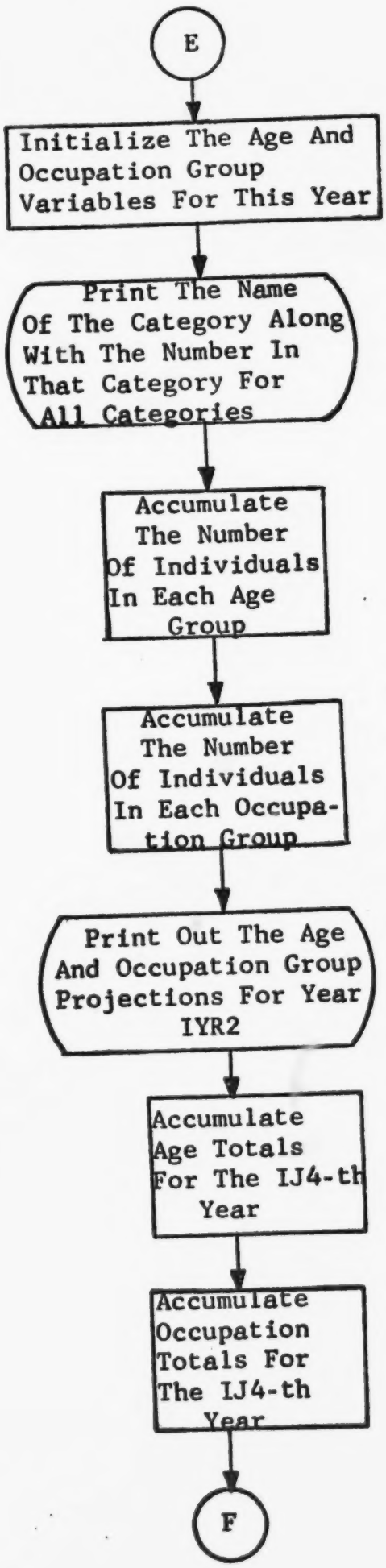
I	NTCAT	L(NTCAT)	LL(NTCAT)	CELL(I)	PARMI(I)	NCAT(I)
1	11	1		10	.1	11
2	11				.2	12
3	11				.5	13
4	11				.1	22
5	11		5		.1	33
6	12	6		20	.2	11
7	12				.6	12
8	12				.1	13
9	12		9		.1	33
10	13	10			.3	12
11	13				.5	13
12	13				.1	21
13	13		13		.1	33
14	11	14		10	.2	12
15	21				.2	13
16	21				.4	21
17	21				.1	22
18	21		18		.1	33
19	22	19		30	.4	21
20	22				.5	22
21	22		21		.1	33
22	23	22		20	.2	21
23	23				.2	22
24	23				.4	23
25	23				.1	31
26	23		26		.1	33
27	31	27		10	.1	22
28	31				.3	23
29	31				.5	31
30	31		30		.1	33
31	32	31		20	.2	23
32	32				.3	31
33	32				.4	33
34	32		34		.1	33
35	33	35			1.0	33

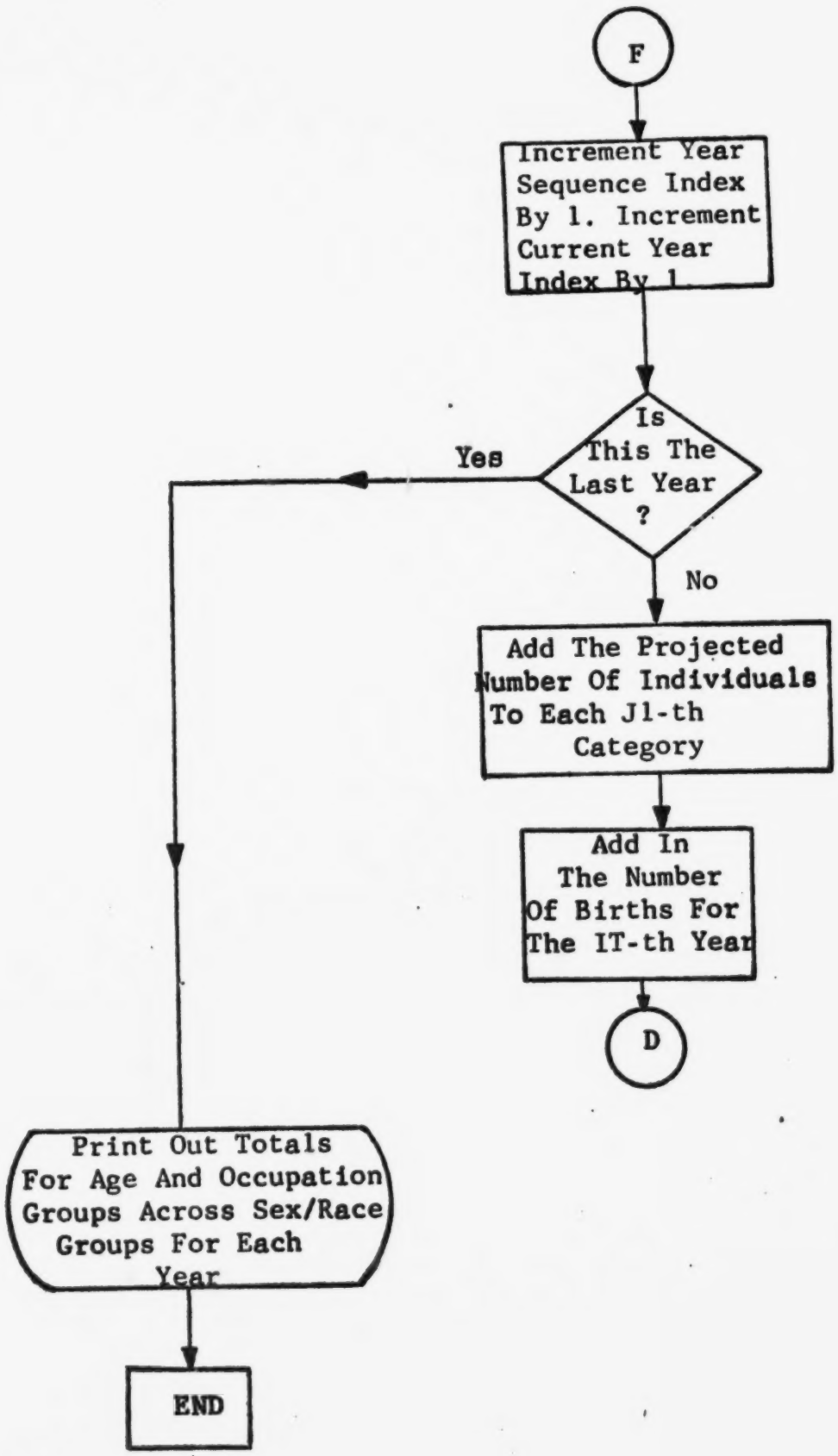
APPENDIX C

Flowchart For DYNAMOD II


Reserve Space For All Subscripted Variables
Initialize The TARG5 (I,J) and TARG6 (I,J) for All I and J
Start With The First Sex/Race Group, IJK=1
A
Initialize Index IJ4 To The First Year
Define The Year Range of Projections
IYR1 = Beginning Year
IYR3 = Last Year
Read in Birth Vector Values for Each Year
Set Max Size On Codes
Initialize L(J) And LL(J) For Each Possible Code
Read In Category Names And Nonzero Transition Probabilities Plus Their Row and Column Indices
C
B


C
B
Call Category Table Set Up Routine
Has Last Non-Zero Transition Probability Been Read ?
No
Yes
Perform Error Checks On DAta Read
C
Any Errors ?
Yes
Call Error Print Routine
Set The Current Year Index IYR2 To IYR1
D
Set Up The Sequence Index For The IYR2-th Year
Store The Number Of Individuals in Each Category In The Vector VAL(1),VAL(2),...,VAL(max(I))
E


E
Initialize The Age And Occupation Group Variables For This Year
Print The Name Of The Category Along With The Number In That Category For All Categories
Accumulate The Number Of Individuals In Each Age Group
Accumulate The Number Of Individuals In Each Occupation Group
Print Out The Age And Occupation Group Projections For Year IYR2
Accumulate Age Totals For The IJ4-th Year
Accumulate Occupation Totals For The IJ4-th Year
F


F
Increment Year Sequence Index By 1. Increment Current Year Index By 1
Is This The Last Year ?
Yes
No
Add The Projected Number Of Individuals To Each J1-th Category
Add In The Number Of Births For The IT-th Year
D
Print Out Totals For Age And Occupation Groups Across Sex/Race Groups For Each Year
END

APPENDIX D

FORTRAN IV Source Program for DYNAMOD II

```
100 $FILE WM,WF,NWM,NWF
110 DIMENSION S(10),CAT(200,3),VAL(200),CELL(200),PARM1(200)
120 DIMENSION NCAT(200),WT(100),L(99),LL(99),BARG5(10)
130 DIMENSION BARG6(10),TARG5(11,9),TARG6(11,9)
135 DO 340 I=1,11
136 DO340 J=1,9
140 TARG5(I,J)=0.0;TARG6(I,J)=0.0
145 340 CONTINUE
150 DO390IJK=1,4;IJ4=1
155 PRINT,"INPUT DATA FOR SEX/RACE GROUP",IJK,"FOLLOWS"
160 IYR1=1960;IYR3=1970;
170 READ(IJK)IS,(S(J),J=1,10)
175 PRINT,"BIRTH VECTOR ELEMENTS"
180 PRINT,(S(J),J=1,10);LSIZE=99
190 DO1050J=1,LSIZE;L(J)=0;LL(J)=0;1050 CONTINUE;
200 IT2=0;I=1;9 READ(IJK,2)(CAT(I,KK),KK=1,3)
202 2 FORMAT(4X,3A6)
210 10 READ(IJK)NTCAT,CELL(I),NCAT(I),PARM1(I)
218 IF(NCAT(I))6,18,6
220 6 IF(NCAT(I)-99)11,9,11
222 11 IF(NTCAT)15,15,8
223 8 IF(NTCAT-LSIZE)810,810,890
230 810 IF(L(NTCAT))820,820,880
231 820 L(NTCAT)=I
232 IF(IT2)830,830,825
233 825 LL(IT2)=I-1
250 IF(LL(IT2)-L(IT2)-100)830,99,99;830 IT2=NTCAT
260 15 I=I+1;GO TO 10
264 18 LAST=I-1;IF(IT2)99,99,19
270 19 LL(IT2)=I-1;20 IF((IS-1)*(LSIZE-IS))99,23,23;
280 23 IST=IS;IF(L(IST))99,99,25;25 CONTINUE;
290 DO27I=1,LAST
295 260 IF((NCAT(I)-1)*(LSIZE-NCAT(I)))99,262,262
300 262 NCATT=NCAT(I);IF(L(NCATT))99,99,27;27 CONTINUE;
310 28 IYR2=IYR1;30 IT=IYR2-IYR1+1;
320 DO40J=1,LSIZE;I=L(J);IF(I)40,40,38;
330 38 VAL(I)=CELL(I);CELL(I)=0.;40 CONTINUE;
340 PRINT,"NUMBER OF PERSONS IN YEAR",IYR2;
350 DO310IJ1=1,10
354 BARG5(IJ1)=0.0;BARG6(IJ1)=0.0
356 310 CONTINUE
360 TVAL=0.0
370 110 DO150J=1,LSIZE;IF(L(J))150,150,112;
380 112 I=L(J);120 PRINT121,J,(CAT(I,KK),KK=1,3),VAL(I)
390 121 FORMAT(I6,4X,3A6,F12.0)
400 TVAL=TVAL+VAL(I)
410 DO304IJ1=2,10
420 IF(J-IJ1*10)301,304,304
430 301 BARG5(IJ1-1)=BARG5(IJ1-1)+VAL(I);GO TO 302
440 304 CONTINUE
450 302 DO303IJ2=1,9;DO303IJ3=10,90,10;
        IF(J-IJ2-IJ3)303,305,303
```

```
470 305 BARG6(IJ2)=BARG6(IJ2)+VAL(I);GO TO 306
480 303 CONTINUE;306 CONTINUE;
490 150 CONTINUE
500 160 PRINT161,TVAL
510 161 FORMAT(8H TOTAL =,F12.0)
520 PRINT,(BARG5(IJ1),IJ1=1,9)
530 PRINT,(BARG6(IJ2),IJ2=1,9)
540 DO341IJ1=1,9;
550 341 TARG5(IJ4,IJ1)=TARG5(IJ4,IJ1)+BARG5(IJ1)
560 DO342IJ2=1,9
570 342 TARG6(IJ4,IJ2)=TARG6(IJ4,IJ2)+BARG6(IJ2)
580 IJ4=IJ4+1;180 IYR2=IYR2+1;
590 IF(IYR2-IYR3)200,200,500;200 CONTINUE;
600 DO300J=1,LSIZE;IF(L(J))300,300,215
610 215 IT1=L(J);IT2=LL(J);TWT=0.;
620 220 DO225I=IT1,IT2;K=I-IT1+1;
630 WT(K)=PARM1(I);TWT=TWT+WT(K);
640 225 CONTINUE
650 230 DO235I=IT1,IT2;K=I-IT1+1;
660 J1=NCAT(I);J2=L(J1);
670 CELL(J2)=CELL(J2)+WT(K)*VAL(IT1)/TWT
680 235 CONTINUE;300 CONTINUE;
690 J=L(IS);CELL(J)=S(IT)+CELL(J);
695 PRINT,"J = ",J," CELL(J) = ",CELL(J)
700 400 GO TO 30
705 880 PRINT,"NTCAT = ",NTCAT,"I = ",I,"  880"
710 GO TO 15
715 890 PRINT,"NTCAT = ",NTCAT, "I = ",I,"  890"
716 GO TO 15
720 99 PRINT,"NTCAT = ",NTCAT,"I = ",I,"CATEGORY IS "
725 PRINT,(CAT(I,KK),KK=1,3),"NCAT(",I,") = ",NCAT(I)
730 500 CONTINUE;390 CONTINUE
740 PRINT,"TOTALS FOR CODES";
750 IJ5=IYR1-1;DO346IJ4=1,11;
760 IJ5=IJ5+1;
770 PRINT,(TARG5(IJ4,IJ1),IJ1=1,9),IJ5;
780 PRINT,(TARG6(IJ4,IJ2),IJ2=1,9);
785 346 CONTINUE
789 $OPT SIZE
790 END DYNAMOD
```

APPENDIX E

Data Files Used as Inputs to DYNAMOD II

White Male File

```
100 19,1878,1834,1798,1772,1687,1608,1658,1724,1790,1858
105 0-4 ELEM. STUDENT ,11,156,11,.0067,
110 0,0,21,.9878,0,0,70,.0055,
115 0,0,99,0.0
120 0-4 OTHER          ,19,8707,11,.0178,
125 0,0,19,.7809,0,0,21,.0889,0,0,29,.1069,0,0,70,.0055,
130 0,0,99,0.0
135 5-14 ELEM STUDENT ,21,13423,21,.8738,
140 0,0,22,.0591,0,0,27,.0009,0,0,29,.0141,0,0,31,.0078,
145 0,0,32,.0423,0,0,37,.0015,0,0,70,.0005,
150 0,0,99,0.0
155 5-14 SEC. STUDENT ,22,669,22,.1129,
160 0,0,28,.0100,0,0,29,.1510,0,0,32,.6523,
165 0,0,33,.0109,0,0,38,.0156,0,0,39,.0468,0,0,70,.0005,
170 0,0,99,0.0
175 5-14 ELEM DROP-OUT,27,0,21,.0111,
180 0,0,29,.3587,0,0,31,.0189,0,0,39,.6108,0,0,70,.0005,
185 0,0,99,0.0
190 5-14 SEC. DROP-OUT,28,0,22,.0117,
195 0,0,29,.3587,0,0,32,.0183,0,0,39,.6108,0,0,70,.0005,
200 0,0,99,0.0
205 5-14 OTHER        ,29,1683,21,.6900,
210 0,0,22,.0012,0,0,29,.2714,0,0,39,.0369,0,0,70,.0005,
215 0,0,99,0.0
220 15-19 ELEM STUDENT,31,334,31,.6955,
225 0,0,32,.0912,0,0,37,.1615,0,0,41,.0303,
230 0,0,42,.0202,0,0,70,.0013,
235 0,0,99,0.0
240 15-19 SEC. STUDENT,32,3290,32,.7521,
245 0,0,33,.0985,0,0,38,.0868,0,0,39,.0021,
250 0,0,42,.0125,0,0,43,.0233,
255 0,0,48,.0230,0,0,49,.0004,0,0,70,.0013,
260 0,0,99,0.0
265 15-19 COL. STUDENT,33,612,33,.6142,
270 0,0,39,.0119,0,0,43,.3530,0,0,44,.0006,
275 0,0,45,.0040,0,0,49,.0152,0,0,70,.0011,
280 0,0,99,0.0
285 15-19 ELEM DROPOUT,37,0,31,.0240,
290 0,0,39,.5847,0,0,41,.0060,0,0,49,.3840,0,0,70,.0013,
295 0,0,99,0.0
300 15-19 SEC DROP-OUT,38,0,32,.0240,
305 0,0,39,.5847,0,0,42,.0060,0,0,49,.3840,0,0,70,.0013,
310 0,0,99,0.0
315 15-19 OTHER        ,39,1766,32,.0029,
320 0,0,33,.0142,0,0,39,.5516,0,0,42,.0004,
325 0,0,43,.0035,0,0,49,.4261,0,0,70,.0013,
330 0,0,99,0.0
335 20-24 ELEM STUDENT,41,28,41,.7056,
340 0,0,42,.0812,0,0,47,.0131,0,0,51,.1750,
345 0,0,52,.0201,0,0,57,.0033,0,0,70,.0017,
350 0,0,99,0.0
```

White Male File contd.

```
355 20-24 SEC. STUDENT,42,140,42,.6124,
360 0,0,43,.0935,0,0,48,.0470,0,0,49,.0470,
365 0,0,52,.1606,0,0,53,.0232,
370 0,0,58,.0073,0,0,59,.0073,0,0,70,.0017,
375 0,0,99,0.0
380 20-24 COL. STUDENT,43,919,43,.6142,
385 0,0,44,.0036,0,0,45,.0160,0,0,49,.1653,
390 0,0,53,.1527,0,0,54,.0006,0,0,55,.0040,
395 0,0,56,.0017,0,0,59,.0408,0,0,70,.0011,
400 0,0,99,0.0
405 20-24 ELEM TEACHER,44,13,44,.7531,
410 0,0,49,.0473,0,0,54,.1868,0,0,59,.0117,
415 0,0,70,.0011,
420 0,0,99,0.0
425 20-24 SEC. TEACHER,45,22,44,.0318,
430 0,0,45,.7245,0,0,49,.0441,0,0,54,.0070,
435 0,0,55,.1806,0,0,59,.0109,0,0,70,.0011,
440 0,0,99,0.0
445 20-24 ELEM DROPOUT,47,0,41,.0240
450 0,0,49,.7746,0,0,51,.0060,
455 0,0,59,.1937,0,0,70,.0017,
460 0,0,99,0.0
465 20-24 SEC. DROPOUT,48,0,42,.0240,
470 0,0,49,.7746,0,0,52,.0060,
475 0,0,59,.1937,0,0,70,.0017,
480 0,0,99,0.0
485 20-24 OTHER        ,49,3791,42,.0001,
490 0,0,43,.0108,0,0,45,.0002,0,0,49,.8319,
495 0,0,53,.0024,0,0,59,.1529,0,0,70,.0017,
500 0,0,99,0.0
505 25-44 ELEM STUDENT,51,29,51,.8355,
510 0,0,52,.1028,0,0,57,.0558,0,0,69,.0033,
515 0,0,70,.0026,
520 0,0,99,0.0
525 25-44 SEC. STUDENT,52,124,52,.7903,
530 0,0,53,.1107,0,0,58,.0441,0,0,59,.0442
535 0,0,69,.0081,0,0,70,.0026,
540 0,0,99,0.0
545 25-44 COL. STUDENT,53,511,53,.7274,
550 0,0,54,.0028,0,0,55,.0189,0,0,56,.0090,
555 0,0,59,.2266,0,0,64,.0001,0,0,65,.0011,
560 0,0,66,.0006,0,0,69,.0118,0,0,70,.0017,
565 0,0,99,0.0
570 25-44 ELEM TEACHER,54,76,54,.8918,
575 0,0,59,.0574,0,0,64,.0411,
580 0,0,69,.0080,0,0,70,.0017,
585 0,0,99,0.0
590 25-44 SEC. TEACHER,55,187,54,.0316,
595 0,0,55,.8639,0,0,59,.0525,0,0,64,.0001,
600 0,0,65,.0474,0,0,69,.0028,0,0,70,.0017,
605 0,0,99,0.0
```

White Male File contd.

```
610 25-44 COL. TEACHER,56,114,54,.0005,
615 0,0,55,.0051,0,0,56,.9199,0,0,59,.0224,
620 0,0,64,.0001,0,0,65,.0003,0,0,66,.0469,
625 0,0,69,.0031,0,0,70,.0017,
630 0,0,99,0.0
635 25-44 ELEM DROPOUT,57,0,51,.0300,
640 0,0,59,.9173,0,0,69,.0501,0,0,70,.0026,
645 0,0,99,0.0
650 25-44 SEC. DROPOUT,58,0,52,.0300,
655 0,0,59,.9173,0,0,69,.0501,0,0,70,.0026,
660 0,0,99,0.0
665 25-44 OTHER          ,59,19701,52,.0001,
670 0,0,53,.0013,0,0,54,.0001,0,0,55,.0004,0,0,56,.0007,
675 0,0,59,.9447,0,0,69,.0501,0,0,70,.0026,
680 0,0,99,0.0
685 44+UP ELEM TEACHER,64,28,64,.9116,
690 0,0,69,.0784,0,0,70,.0100,
695 0,0,99,0.0
700 44+UP SEC. TEACHER,65,73,64,.0284,
705 0,0,65,.8869,0,0,69,.0747,0,0,70,.0100,
710 0,0,99,0.0
715 44+UP COL. TEACHER,66,89,64,.0005,
720 0,0,65,.0057,0,0,66,.9039,0,0,69,.0799,0,0,70,.0100,
725 0,0,99,0.0
730 44+UP OTHER          ,69,22779,65,.0001,
735 0,0,66,.0004,0,0,69,.9677,0,0,70,.0318,
740 0,0,99,0.0
745 DEAD                 ,70,0,70,1.0
750 0,0,0,0.0
```

Nonwhite Male File

```
100 19,349,347,345,349,334,316,328,341,355,370,
110 0-4 ELEM. STUDENT ,11,34,11,.0443,
120 0,0,21,.9450,0,0,70,.0107,
130 0,0,99,0,0
140 0-4 OTHER          ,19,1455,11,.0249,
150 0,0,19,.7789,0,0,21,.0857,0,0,29,.0998,0,0,70,.0107,
155 0,0,99,0,0
160 5-14 ELEM. STUDENT,21,1993,21,.6737,
170 0,0,22,.0591,0,0,27,.0046,0,0,29,.0100,
180 0,0,31,.0078,0,0,32,.0424,0,0,37,.0015,0,0,70,.0007,
185 0,0,99,0,0
190 5-14 SEC. STUDENT ,22,70,22,.1129,
200 0,0,26,.0454,0,0,29,.1156,0,0,32,.6523,
201 0,0,33,.0109,0,0,38,.0513,0,0,39,.0109,0,0,70,.0007,
202 0,0,99,0,0
203 5-14 ELEM DROPOUT ,27,0,21,.0240,
204 0,0,29,.6785,0,0,31,.0060,0,0,39,.2908,0,0,70,.0007,
205 0,0,99,0,0
206 5-14 SEC. DROPOUT ,26,0,22,.0240,
208 0,0,29,.6785,0,0,32,.0060,0,0,39,.2908,0,0,70,.0007,
209 0,0,99,0,0
210 5-14 OTHER          ,29,329,21,.7966,
220 0,0,29,.1905,0,0,39,.0122,0,0,70,.0007,
225 0,0,99,0,0
230 15-19 ELEM STUDENT,31,116,31,.6953,
240 0,0,32,.0912,0,0,37,.1440,0,0,41,.0303,
250 0,0,42,.0202,0,0,47,.0174,0,0,70,.0016,
255 0,0,99,0,0
260 15-19 SEC. STUDENT,32,381,32,.7520,
270 0,0,33,.0535,0,0,38,.0869,0,0,39,.0470,0,0,42,.0124,
280 0,0,43,.0232,0,0,48,.0117,0,0,49,.0117,0,0,70,.0016,
285 0,0,99,0,0
290 15-19 COL. STUDENT,33,22,33,.6140,
300 0,0,39,.0116,0,0,43,.3527,0,0,44,.0007,
310 0,0,45,.0040,0,0,49,.0152,0,0,70,.0014,
311 0,0,99,0,0
312 15-19 ELEM DROPOUT,37,0,31,.0240,
313 0,0,39,.5641,0,0,41,.0060,0,0,49,.3643,0,0,70,.0016,
315 0,0,99,0,0
316 15-19 SEC. DROPOUT,36,0,32,.0240,
317 0,0,39,.5641,0,0,42,.0060,0,0,49,.3643,0,0,70,.0016,
319 0,0,99,0,0
320 15-19 OTHER          ,39,274,32,.0035,
330 0,0,33,.0032,0,0,39,.4014,0,0,43,.0008,
340 0,0,49,.3875,0,0,70,.0016,
345 0,0,99,0,0
350 20-24 ELEM STUDENT,41,17,41,.7051,
360 0,0,42,.0811,0,0,47,.0131,0,0,51,.1746,
370 0,0,52,.0201,0,0,57,.0032,0,0,70,.0026,
375 0,0,99,0,0
```

Nonwhite Male File contd.

```
360 20-24 SEC. STUDENT,42,30,42,.6119,
390 0,0,43,.0934,0,0,46,.0470,0,0,49,.0470,0,0,52,.1602,
400 0,0,53,.0231,0,0,56,.0073,0,0,59,.0073,0,0,70,.0026,
405 0,0,99,0,0
410 20-24 COL. STUDENT,43,47,43,.6136,
420 0,0,44,.0036,0,0,45,.0160,0,0,49,.1658,
430 0,0,53,.1520,0,0,54,.0009,0,0,55,.0040,
440 0,0,56,.0015,0,0,59,.0410,0,0,70,.0014,
445 0,0,99,0,0
450 20-24 ELEM TEACHER,44,5,44,.7525,
460 0,0,49,.0479,0,0,54,.1863,0,0,59,.0119,0,0,70,.0014,
465 0,0,99,0,0
470 20-24 SEC. TEACHER,45,1,44,.0317,
480 0,0,45,.7239,0,0,49,.0448,0,0,54,.0079,
490 0,0,55,.1792,0,0,59,.0111,0,0,70,.0014,
491 0,0,99,0,0
492 20-24 ELEM DROPOUT,47,0,41,.0240,
493 0,0,49,.7963,0,0,51,.0060,0,0,59,.1689,0,0,70,.0028,
495 0,0,99,0,0
496 20-24 SEC. DROPOUT,46,0,42,.0240,
497 0,0,49,.7963,0,0,52,.0060,0,0,59,.1689,0,0,70,.0028,
498 0,0,99,0,0
500 20-24 OTHER      ,49,547,43,.0035,
510 0,0,44,.0003,0,0,45,.0001,0,0,49,.6164,
520 0,0,53,.0009,0,0,59,.1748,0,0,70,.0028,
525 0,0,99,0,0
530 25-44 ELEM STUDENT,51,8,51,.8348,
540 0,0,52,.1027,0,0,57,.0534,0,0,69,.0030,0,0,70,.0061,
545 0,0,99,0,0
550 25-44 SEC. STUDENT,52,11,52,.7889,
560 0,0,53,.1106,0,0,56,.0434,0,0,59,.0434,
562 0,0,69,.0076,0,0,70,.0061,
565 0,0,99,0,0
570 25-44 COL. STUDENT,53,33,53,.7267,
580 0,0,54,.0043,0,0,55,.0189,0,0,56,.0071,0,0,59,.2272,
590 0,0,64,.0002,0,0,65,.0010,0,0,66,.0004,
592 0,0,69,.0114,0,0,70,.0026,
595 0,0,99,0,0
600 25-44 ELEM TEACHER,54,10,54,.8910
610 0,0,59,.0366,0,0,64,.0447,0,0,69,.0029,0,0,70,.0026,
615 0,0,99,0,0
620 25-44 SEC. TEACHER,55,13,54,.0376,
630 0,0,55,.8572,0,0,59,.0548,0,0,64,.0019,
640 0,0,65,.0430,0,0,69,.0027,0,0,70,.0026,
645 0,0,99,0,0
650 25-44 COL. TEACHER,56,6,54,.0009,
660 0,0,55,.0051,0,0,56,.9136,0,0,59,.0306,
670 0,0,65,.0003,0,0,66,.0443,0,0,69,.0030,0,0,70,.0026,
671 0,0,99,0,0
```

APPENDIX F

DYNAMOD II Sample Output of Detailed Population Categories, and Subtotals for Age and Occupation Groups

INPUT DATA FOR SCANNING GROUP 1 FOLLOWS
WITH VECTOR ELEMENTS

1576.00	1534.00	1796.00	1772.00	1667.00
1605.00	1456.00	1724.00	1790.00	1556.00

11	0-4 ELEM. STUDENT	146.
12	0-4 OTHER	6864.
21	5-14 ELEM STUDENT	15177.
22	5-14 SEC. STUDENT	999.
27	5-14 ELEM DROP-OUT	13.
28	5-14 SEC. DROP-OUT	10.
29	5-14 OTHER	1722.
31	15-19 ELEM STUDENT	375.
32	15-19 SEC. STUDENT	4770.
33	15-19 COL. STUDENT	1125.
37	15-19 ELEM DROPOUT	42.
38	15-19 SEC DROP-OUT	413.
39	15-19 OTHER	916.
41	20-24 ELEM STUDENT	37.
42	20-24 SEC. STUDENT	176.
43	20-24 COL. STUDENT	1289.
44	20-24 ELEM TEACHER	22.
45	20-24 SEC. TEACHER	71.
47	20-24 ELEM DROPOUT	.
48	20-24 SEC. DROPOUT	113.
49	20-24 OTHER	4439.
51	25-44 ELEM STUDENT	33.
52	25-44 SEC. STUDENT	142.
53	25-44 COL. STUDENT	757.
54	25-44 ELEM TEACHER	103.
55	25-44 SEC. TEACHER	821.
56	25-44 COL. TEACHER	171.
57	25-44 ELEM DROPOUT	2.
58	25-44 SEC. DROPOUT	7.
59	25-44 OTHER	18612.
64	44+UP ELEM TEACHER	46.
65	44+UP SEC. TEACHER	99.
66	44+UP COL. TEACHER	126.
69	44+UP OTHER	24134.
70	DEAD	5230.

TOTAL = 99641.

8212.0713	17921.754	7680.9203	6327.709	26648.324
4440.04	5827.6553	0.00	0.00	
15770.153	6086.3924	3167.6940	171.1299	366.6745
297.3656	97.6873	343.7697	56.9131	

Nonwhite Male File contd.

```
671 25-44 ELEM DROPOUT.57.0.51..0300.
673 0.0.59..9164.0.0.69..0475.0.0.70..0061
675 0.0.99.0.0
676 25-44 SEC. DROPOUT.58.0.52..0300.
677 0.0.59..9164.0.0.69..0475.0.0.70..0061.
679 0.0.99.0.0
680 25-44 OTHER        .59.2374.53..0007.
690 0.0.54..0001.0.0.55..0003.0.0.56..0002.
700 0.0.59..9451.0.0.69..0475.0.0.70..0061.
705 0.0.99.0.0
710 44+UP ELEM TEACHER.64.5.64..9964.
720 0.0.69..0736.0.0.70..0160.
725 0.0.99.0.0
730 44+UP SEC. TEACHER.65.0.64..0363.
740 0.0.65..0736.0.0.69..0719.0.0.70..0160.
745 0.0.99.0.0
750 44+UP COL. TEACHER.66.6.64..0010.
760 0.0.65..0052.0.0.66..9007.0.0.69..0771.0.0.70..0160.
765 0.0.99.0.0
770 44+UP OTHER        .69.2256.64..0001.
780 0.0.66..0003.0.0.69..9644.0.0.70..0352.
785 0.0.99.0.0
790 DEAD               .70.0.70.1.0
795 0.0.0.0.0
```

Nonwhite Female File

```
100 19.341.339.336.341.327.309.320.333.347.362.
110 0-4 ELEM. STUDENT .11.46.11..1019.
120 0.0.21..4695.0.0.70..0006.
125 0.0.99.0.0
130 0-4 OTHER          .19.1444.11..0342.
140 0.0.19..7763.0.0.21..0906.0.0.29..0003.0.0.70..0006.
145 0.0.99.0.0
150 5-14 ELEM. STUDENT.21.1966.21..0739.
160 0.0.22..0591.0.0.27..0149.0.0.31..0076.
170 0.0.32..0423.0.0.37..0015.0.0.70..0005.
175 0.0.99.0.0
180 5-14 SEC. STUDENT .22.107.22..1026.
190 0.0.28..0076.0.0.29..1602.0.0.32..5926.
200 0.0.33..0069.0.0.38..0076.0.0.39..0416.0.0.70..0005.
201 0.0.99.0.0
202 5-14 ELEM DROPOUT .27.0.21..0162.
203 0.0.27..9540.0.0.31..0138.0.0.39..0155.0.0.70..0005.
205 0.0.99.0.0
206 5-14 SEC. DROPOUT .28.0.22..0162.
207 0.0.29..9540.0.0.32..0136.0.0.39..0155.0.0.70..0005.
209 0.0.99.0.0
210 5-14 OTHER          .29.316.21..7729.
220 0.0.29..1973.0.0.39..0293.0.0.70..0005.
225 0.0.99.0.0
230 15-19 ELEM STUDENT.31.66.31..6959.
240 0.0.32..0912.0.0.37..1442.0.0.41..0303.
250 0.0.42..0202.0.0.47..0174.0.0.70..0006.
255 0.0.99.0.0
260 15-19 SEC. STUDENT.32.312.32..6841.
270 0.0.33..0334.0.0.36..1254.0.0.39..0042.
280 0.0.42..0114.0.0.43..0146.0.0.46..0313.
282 0.0.43..0144.0.0.70..0006.
285 0.0.99.0.0
290 15-19 COL. STUDENT.33.36.33..6010.
300 0.0.39..0142.0.0.43..3493.0.0.44..0060.
310 0.0.43..0046.0.0.49..0164.0.0.70..0007.
311 0.0.99.0.0
312 15-19 ELEM DROPOUT.37.0.31..0240.
313 0.0.37..5636.0.0.41..0060.0.0.49..3654.0.0.70..0006.
315 0.0.99.0.0
316 15-19 SEC. DROPOUT.38.0.32..0240.
317 0.0.39..5636.0.0.42..0060.0.0.49..3654.0.0.70..0006.
319 0.0.99.0.0
320 15-19 OTHER          .39.349.32..0002.
330 0.0.33..0031.0.0.39..6025.0.0.42..0006.
340 0.0.43..0006.0.0.49..3108.0.0.70..0006.
345 0.0.99.0.0
350 20-24 ELEM STUDENT.41.11.41..7046.
360 0.0.42..0011.0.0.47..0131.0.0.51..1750.
370 0.0.52..0101.0.0.57..0033.0.0.70..0013.
375 0.0.99.0.0
```

Nonwhite Female File contd.

```
380 20-24 SEC. STUDENT,42,35,42,.5570,
390 0,0,43,.0595,0,0,48,.0564,0,0,49,.1274,
400 0,0,52,.1536,0,0,53,.0147,0,0,58,.0141,
402 0,0,59,.0160,0,0,70,.0013,
405 0,0,99,0.0
410 20-24 COL. STUDENT,43,31,43,.6081
420 0,0,44,.0242,0,0,45,.0194,0,0,49,.1485,
430 0,0,53,.1507,0,0,54,.0060,0,0,55,.0048,
440 0,0,56,.0010,0,0,59,.0366,0,0,70,.0007,
445 0,0,99,0.0
450 20-24 ELEM TEACHER,44,7,44,.7342,
460 0,0,49,.0666,0,0,54,.1820,0,0,59,.0165,
462 0,0,70,.0007,
465 0,0,99,0.0
470 20-24 SEC. TEACHER,45,2,44,.0424,
480 0,0,45,.6942,0,0,49,.0642,0,0,54,.0105,
490 0,0,55,.1721,0,0,59,.0159,0,0,70,.0007,
491 0,0,99,0.0
492 20-24 ELEM DROPOUT,47,0,41,.0240,
493 0,0,49,.7993,0,0,51,.0060,0,0,59,.1694,0,0,70,.0013,
495 0,0,99,0.0
496 20-24 SEC. DROPOUT,48,0,42,.0240,
497 0,0,49,.7993,0,0,52,.0060,0,0,59,.1694,0,0,70,.0013,
499 0,0,99,0.0
500 20-24 OTHER          ,49,620,43,.0014,
510 0,0,44,.0003,0,0,45,.0001,0,0,49,.8215,
520 0,0,53,.0003,0,0,54,.0001,0,0,55,.0001,
522 0,0,59,.1749,0,0,70,.0032
525 0,0,99,0.0
530 25-44 ELEM STUDENT,51,11,51,.8361,
540 0,0,52,.1029,0,0,57,.0540,0,0,69,.0031,0,0,70,.0039,
545 0,0,99,0.0
550 25-44 SEC. STUDENT,52,24,52,.7573,
560 0,0,53,.0704,0,0,58,.0705,0,0,59,.0850,
562 0,0,69,.0129,0,0,70,.0039,
565 0,0,99,0.0
570 25-44 COL. STUDENT,53,17,53,.7201,
580 0,0,54,.0287,0,0,55,.0229,0,0,56,.0049,
585 0,0,59,.2085,0,0,64,.0015,0,0,65,.0012,
590 0,0,66,.0002,0,0,69,.0107,0,0,70,.0013,
595 0,0,99,0.0
600 25-44 ELEM TEACHER,54,36,54,.8695,
610 0,0,59,.0886,0,0,64,.0443,0,0,69,.0041,0,0,70,.0013,
615 0,0,99,0.0
620 25-44 SEC. TEACHER,55,11,54,.0502,
630 0,0,55,.8221,0,0,59,.0779,0,0,64,.0026,
640 0,0,65,.0419,0,0,69,.0040,0,0,70,.0013,
645 0,0,99,0.0
```

Nonwhite Female File Contd.

```
650 25-44 COL. TEACHER,56,4,54,.0096,
660 0,0,55,.0065,0,0,56,.8996,0,0,59,.0346,
670 0,0,64,.0005,0,0,65,.0003,0,0,66,.0442,
671 0,0,69,.0034,0,0,70,.0013,
672 0,0,99,0.0
673 25-44 ELEM DROPOUT,57,0,51,.0300,
674 0,0,59,.9178,0,0,69,.0483,0,0,70,.0039,
675 0,0,99,0.0
676 25-44 SEC. DROPOUT,58,0,52,.0300,
677 0,0,59,.9178,0,0,69,.0483,0,0,70,.0039,
679 0,0,99,0.0
680 25-44 OTHER       ,59,2660,53,.0002,
690 0,0,54,.0004,0,0,55,.0002,0,0,56,.0002,
700 0,0,59,.9468,0,0,69,.0483,0,0,70,.0039,
705 0,0,99,0.0
710 44+UP ELEM TEACHER,64,20,64,.8934,
720 0,0,69,.0926,0,0,70,.0140,
725 0,0,99,0.0
730 44+UP SEC. TEACHER,65,10,64,.0516,
740 0,0,65,.8447,0,0,69,.0897,0,0,70,.0140,
745 0,0,99,0.0
750 44+UP COL. TEACHER,66,2,64,.0098,
760 0,0,65,.0067,0,0,66,.8914,0,0,69,.0781,0,0,70,.0140,
765 0,0,99,0.0
770 44+UP OTHER       ,69,2380,64,.0003,
780 0,0,65,.0003,0,0,66,.0001,
782 0,0,69,.9731,0,0,70,.0262,
785 0,0,99,0.0
[illegible]
795 0,0,0,0.0
```

White Female File

```
110 19,1782,1740,1705,1680,1600,1525,1574,1636,1699,1763,
120 0-4 ELEM. STUDENT ,11,147,11,.0068,
130 0,0,21,.9890,0,0,70,.0042,
135 0,0,99,0.0
140 0-4 OTHER          ,19,8376,11,.0175,
150 0,0,19,.7823,0,0,21,.0893,0,0,29,.1067,0,0,70,.0042,
155 0,0,99,0.0
160 5-14 ELEM. STUDENT,21,12888,21,.8741,
170 0,0,22,.0591,0,0,27,.0018,0,0,29,.0131,0,0,31,.0078,
180 0,0,32,.0423,0,0,37,.0015,0,0,70,.0003,
185 0,0,99,0.0
190 5-14 SEC. STUDENT ,22,720,22,.1027,
200 0,0,28,.0119,0,0,29,.1558,0,0,32,.6001,
210 0,0,33,.0089,0,0,38,.0320,0,0,39,.0883,0,0,70,.0003,
211 0,0,99,0.0
212 5-14 ELEM DROP-OUT,27,0,21,.0162,
213 0,0,29,.8904,0,0,31,.0138,0,0,39,.0793,0,0,70,.0003,
214 0,0,99,0.0
215 5-14 SEC. DROP-OUT,28,0,22,.0081,YI
21 0,0,29,.8985,0,0,32,.0219,0,0,39,.0712,0,0,70,.0003,
217 0,0,99,0.0
220 5-14 OTHER          ,29,1569,21,.7191,
230 0,0,22,.0012,0,0,29,.2450,0,0,32,.0001,
240 0,0,39,.0343,0,0,70,.0003,
245 0,0,99,0.0
250 15-19 ELEM STUDENT,31,196,31,.6958,
260 0,0,32,.0912,0,0,37,.1436,0,0,41,.0304,
270 0,0,42,.0202,0,0,47,.0183,0,0,70,.0005,
275 0,0,99,0.0
280 15-19 SEC. STUDENT,32,3121,32,.6643,
290 0,0,33,.0724,0,0,38,.1047,0,0,39,.0661,0,0,42,.0114,
300 0,0,43,.0146,0,0,45,.0262,0,0,47,.0196,0,0,70,.0005,
305 0,0,99,0.0
310 15-19 COL. STUDENT,33,562,33,.6078,
320 0,0,39,.0142,0,0,43,.3514,0,0,44,.0060,
330 0,0,45,.0048,0,0,49,.0154,0,0,70,.0004,
331 0,0,99,0.0
332 15-19 ELEM DROPOU',37,0,31,.0240,
333 0,0,39,.5642,0,0,41,.0060,0,0,49,.3653,0,0,70,.0005,
334 0,0,99,0.0
335 15-19 SEC. DROPOUT,38,0,32,.0240,
336 0,0,39,.5642,0,0,41,.0060,0,0,49,.3653,0,0,70,.0005,
337 0,0,99,0.0
340 15-19 OTHER          ,39,1930,32,.0026,
350 0,0,33,.0114,0,0,37,.3942,0,0,42,.0006,
360 0,0,43,.0022,0,0,47,.3443,0,0,70,.0005,
365 0,0,99,0.0
370 20-24 ELEM STUDENT,41,14,41,.7055,
380 0,0,42,.0018,0,0,47,.0131,0,0,51,.1757,
390 0,0,52,.0008,0,0,57,.0033,0,0,70,.0005,
395 0,0,99,0.0
```

White Female File Contd.

```
400 20-24 SEC. STUDENT,42,38,42,.5569,
410 0,0,43,.0595,0,0,48,.0343,0,0,49,.1495,
420 0,0,52,.1542,0,0,53,.0148,0,0,58,.0086,
422 0,0,59,.0216,0,0,70,.0006,
425 0,0,99,0.0
430 20-24 COL. STUDENT,43,417,43,.6080,
440 0,0,44,.0272,0,0,45,.0194,0,0,49,.1451,
450 0,0,53,.1514,0,0,54,.0060,0,0,55,.0048,
460 0,0,56,.0010,0,0,59,.0367,0,0,70,.0004,
465 0,0,99,0.0
470 20-24 ELEM TEACHER,44,92,41,.0000,
480 0,0,44,.7691,0,0,49,.0313,0,0,54,.1827,
490 0,0,59,.0165,0,0,70,.0004,
495 0,0,99,0.0
500 20-24 SEC. TEACHER,45,34,44,.0424,
510 0,0,45,.6941,0,0,49,.0638,0,0,54,.0106,
520 0,0,55,.1728,0,0,59,.0159,0,0,70,.0004,
521 0,0,99,0.0
522 20-24 ELEM DROPOUT,47,0,41,.0240,
523 0,0,49,.7992,0,0,51,.0060,0,0,59,.1702,0,0,70,.0006,
525 0,0,99,0.0
526 20-24 SEC. DROPOUT,48,0,42,.0240,
527 0,0,49,.7992,0,0,52,.0060,0,0,59,.1702,0,0,70,.0006,
528 0,0,99,0.0
530 20-24 OTHER        ,49,4205,43,.0028,
540 0,0,44,.0009,0,0,45,.0003,0,0,49,.8192,
550 0,0,53,.0007,0,0,54,.0001,0,0,55,.0001,
560 0,0,59,.1753,0,0,70,.0006,
565 0,0,99,0.0
570 25-44 ELEM STUDENT,51,26,51,.8363,
580 0,0,52,.1250,0,0,57,.0339,0,0,69,.0034,0,0,70,.0014,
585 0,0,99,0.0
590 25-44 SEC. STUDENT,52,69,52,.7625,
600 0,0,53,.0704,0,0,58,.0429,0,0,59,.1092,
602 0,0,69,.0136,0,0,70,.0014,
605 0,0,99,0.0
610 25-44 COL. STUDENT,53,148,53,.7203,
620 0,0,54,.0287,0,0,55,.0229,0,0,56,.0049,
630 0,0,59,.2085,0,0,64,.0015,0,0,65,.0012,
640 0,0,66,.0002,0,0,69,.0112,0,0,70,.0006,
645 0,0,99,0.0
650 25-44 ELEM TEACHER,54,279,54,.8697,
660 0,0,59,.0791,0,0,64,.0464,0,0,69,.0042,0,0,70,.0006,
675 0,0,99,0.0
680 25-44 SEC. TEACHER,55,91,54,.0302,
690 0,0,55,.8223,0,0,59,.0746,0,0,64,.0027,
700 0,0,65,.0433,0,0,69,.0041,0,0,70,.0006,
705 0,0,99,0.0
```

White Female File contd.

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710 25-44 COL. TEACHER,56,29,54,.0096,
720 0,0,55,.0065,0,0,56,.9058,0,0,59,.0269,
730 0,0,64,.0005,0,0,65,.0003,0,0,66,.0493,
740 0,0,69,.0005,0,0,70,.0006,
741 0,0,99,0.0
742 25-44 ELEM DROPOUT,57,0,51,.0300,
743 0,0,59,.9180,0,0,69,.0506,0,0,70,.0014,
745 0,0,99,0.0
746 25-44 SEC. DROPOUT,58,0,52,.0300,
747 0,0,59,.9180,0,0,69,.0506,0,0,70,.0014,
748 0,0,99,0.0
750 25-24 OTHER        ,59,20512,52,.0001,
760 0,0,53,.0002,0,0,54,.0004,0,0,55,.0003,
770 0,0,56,.0003,0,0,59,.9467,0,0,69,.0506,0,0,70,.0014,
775 0,0,99,0.0
780 44+UP ELEM TEACHER,64,381,64,.9065,
790 0,0,69,.0865,0,0,70,.0070,
795 0,0,99,0.0
800 44+UP SEC. TEACHER,65,134,64,.0518
810 0,0,65,.8681,0,0,69,.0731,0,0,70,.0070,
815 0,0,99,0.0
820 44+UP COL. TEACHER,66,33,64,.0099,
830 0,0,65,.0067,0,0,66,.9445,0,0,69,.0316,0,0,70,.0070,
835 0,0,99,0.0
840 44+UP OTHER        ,69,24665,64,.0006,
850 0,0,65,.0005,0,0,66,.0001,
852 0,0,69,.9766,0,0,70,.0222,
855 0,0,99,0.0
860 DEAD                    ,70,0,70,1.0
865 0,0,0,0.
```

APPENDIX G

DYNAMOD II Sample Output of Totals Over All Sex/Race Groups for Age and Occupation Groupings

TOTALS FOR CODES

20365.00	35735.00	13467.00	11116.00	47134.00
52865.00	0.00	0.00	0.00	1960
31511.00	9271.00	3377.00	952.00	580.00
283.00	0.00	0.00	134708.00	
20354.423	37073.364	13655.941	11871.269	46628.385
53766.447	1682.1703	0.00	0.00	1961
32674.588	10012.287	3761.5906	959.4016	579.0874
307.7682	239.5956	958.2593	133837.25	
20247.431	38062.175	14271.076	12422.58	46264.828
54615.728	3368.1796	0.00	0.00	1962
33468.744	10707.223	4111.4971	972.6607	622.1849
331.8755	248.8814	1016.2496	134484.38	
20087.472	38902.382	14976.462	12910.146	46040.548
55422.69	5116.3791	0.00	0.00	1963
34252.061	11308.732	4461.2151	991.4955	648.772
355.3759	256.6567	1069.1915	134998.12	
19916.962	39626.146	15678.274	13398.962	45919.642
56194.517	6365.4965	0.00	0.00	1964
34934.684	11836.431	4804.7402	1014.5142	678.3551
376.3305	264.189	1154.3375	135486.99	
19588.895	40242.786	16336.442	13910.781	45917.286
56937.332	8634.6773	0.00	0.00	1965
35524.743	12300.946	5142.6487	1041.399	710.5182
400.897	271.0466	1211.2483	136338.93	
19138.749	40730.628	16924.724	14446.601	45991.864
57656.616	10422.417	0.00	0.00	1966
36098.721	12700.649	5464.5478	1071.301	744.8735
424.8738	277.3779	1261.1134	136943.84	
18905.184	41075.318	17478.129	14999.243	46162.296
58358.429	12227.431	0.00	0.00	1967
36370.687	13463.967	5769.1993	1104.3046	781.0388
444.9939	283.8107	1304.795	137654.79	
18678.985	41228.111	17931.18	15537.933	46405.86
59047.444	14050.487	0.00	0.00	1968
36435.382	13367.639	6054.2082	1139.4905	818.632
464.8206	287.8226	1342.813	139077.49	
18818.539	41942.676	18358.635	16111.484	46778.164
59726.695	15892.846	0.00	0.00	1969
36647.701	13822.477	6317.8556	1177.1741	857.2732
487.1962	291.8261	1375.3968	140361.49	
18272.669	41760.115	18709.137	16636.13	47013.103
60497.499	17734.607	0.00	0.00	1970
37048.451	13823.021	6556.7405	1214.4848	896.5867
508.1314	293.1804	1402.6849	142267.53	

APPENDIX H

Definition of Category Codes Used in DYNAMOD II

Code	Description
11	0-4 year old elementary student
17	0-4 year old elementary school dropout
19	0-4 year old other
21	5-14 year old elementary student
22	5-14 year old secondary student
27	5-14 year old elementary school dropout
28	5-14 year old secondary school dropout
29	5-14 year old other
31	15-19 year old elementary student
32	15-19 year old secondary student
33	15-19 year old college student
37	15-19 year old elementary school dropout
38	15-19 year old secondary school dropout
39	15-19 year old other
41	20-24 year old elementary student
42	20-24 year old secondary student
43	20-24 year old college student
44	20-24 year old elementary teacher
45	20-24 year old secondary teacher
47	20-24 year old elementary school dropout
48	20-24 year old secondary school dropout
49	20-24 year old other
51	25-44 year old elementary student
52	25-44 year old secondary student
53	25-44 year old college student
54	25-44 year old elementary teacher
55	25-44 year old secondary teacher
56	25-44 year old college teacher
57	25-44 year old elementary school dropout
58	25-44 year old secondary school dropout
59	25-44 year old other
64	44 + elementary teacher
65	44 + secondary teacher
66	44 + college teacher
69	44 + other
70	Dead